

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

DUNLOP, Brian Kenneth  
Wynne-Jones, Laine & James  
Essex Place, 22 Rodney Road  
Cheltenham  
Gloucestershire, GL50 1JJ  
GRANDE BRETAGNE

PCT

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing  
(day/month/year)

11.05.2001

Applicant's or agent's file reference  
BD/JS/DBN.105

**IMPORTANT NOTIFICATION**

International application No.  
PCT/GB00/00671

International filing date (day/month/year)  
24/02/2000

Priority date (day/month/year)  
26/02/1999

Applicant

TRIKON HOLDINGS LIMITED et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

**4. REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/

 European Patent Office  
D-80298 Munich  
Tel. +49 89 2399 - 0 Tx: 523656 epmu d  
Fax: +49 89 2399 - 4465

Authorized officer

Hopwood, S

Tel.+49 89 2399-2429



# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference BD/JS/DBN.105	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/00671	International filing date (day/month/year) 24/02/2000	Priority date (day/month/year) 26/02/1999
International Patent Classification (IPC) or national classification and IPC H01L21/316		
Applicant TRIKON HOLDINGS LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.  
  
☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand  16/09/2000	Date of completion of this report  11.05.2001
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  Cockcroft, Y  Telephone No. +49 89 2399 2436  

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00671

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

### Description, pages:

1-17 as originally filed

### Claims, No.:

1-19 as originally filed

### Drawings, sheets:

1/11-11/11 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB00/00671

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims 8-11, 13, 15, 16
	No: Claims 1-7, 12, 14, 17-19
Inventive step (IS)	Yes: Claims
	No: Claims 8-11, 13, 15, 16
Industrial applicability (IA)	Yes: Claims 1-19
	No: Claims

2. Citations and explanations  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

**To Point V**

Reference is made to the following documents:

D1 = EP-A-0 761 841; and

D2 = DE-A-19 654 737.

Document D1 shows a method of processing a polymer layer via heating and exposure to a plasma during the heating (see column 7, lines 14-40). It is clear from the suggested starting materials of D1 (column 8, lines 24-45) that at least some of the polymers formed in D1 must include Si-C bonds. Moreover, it is explicitly stated that the heating and plasma treatment will remove moisture from the film (column 7, lines 52-55) and render it denser (column 7, lines 55-58). D1 contains all the features of claim 1 of the application. The claim lacks novel subject matter in comparison to this teaching and does not satisfy Article 33.2 PCT.

The method of claim 1 is also explicitly described in document D2 (see column 28, line 20 to column 29, line 37) wherein it is also clear that the treatment must, in some cases, desorb moisture (column 31, lines 7-16). Hence claim 1 also lacks new subject matter in comparison to this document. Article 33.2 PCT is not satisfied here either.

The plasma in D2 is a hydrogen plasma and claim 2 cannot render the subject matter of claim 1 new.

The plasma is present throughout the heating stage in both of the cited documents. Claim 3 lacks novel subject matter (Article 33.2 PCT) with respect to D1 or D2.

As can be seen from figure 2 of D1, the layer is supported on an electrode and an RF power source is connected to the electrode to partly maintain the plasma. Moreover, the power source to this electrode is 400 watts (column 7, lines 32-34). Claims 4 and 5 cannot be used to form a new claim with respect to D1.

Both D1 and D2 show the plasma being at least partly maintained by an RF power source feeding an electrode spaced apart from the layer (see figure 2 in D1 and figure 9 in D2). Moreover, the power to this electrode in D2 is 400 watts (column 7, lines 30-32). The subject matter of claim 6 lacks novelty in comparison to D1 or D2 and that of claim 7 lacks novelty with respect to D1. Article 33.2 PCT is not satisfied for either of these claims.

The layer of D1 is supported on a platen heated to 370°C (column 7, lines 20-21) such that claim 12 also lacks novel subject matter.

The method of D2 results in a film preferably having a dielectric constant of 1.0-2.5 (column 5, lines 51-53). Claim 14 does not contain any new subject matter in comparison to this teaching.

It is clear that in both documents the layer is an insulating layer on a semiconductor wafer. Claim 17 does not meet the requirements of Article 33.2 PCT.

As the methods of D1 and D2 are at least partially identical to those of the application, they must result in reduced cracking and improved wet etch rate of the layer. Claims 18 and 19 lack novel subject matter (see also point VIII below with respect to these claims).

Once it is known from D1 and D2 to use plasma treatment of the dielectric to improve the properties thereof, no inventive merit can be seen in the selection of an inductively coupled power source to maintain the plasma. This is one of a limited number of well known alternatives. Furthermore, the skilled person will select the required power without any inventive thought being required. The subject matter of claims 8 and 9 does not satisfy Article 33.3 PCT.

The plasma treatment of D1 is performed for 5 minutes, that in D2 for 10 minutes. The skilled person would consider reducing these times, especially when the plasma power is higher than in the prior art. Claims 10 and 11 do not contain any inventive subject matter (Article 33.3 PCT).

Claim 13 is a combination of the features of claims 1-4 and 11 with the additional features that the power source provides 600 watts and the temperature of the platen is between 400°C and 500°C. It is quite clear that parameters such as the power and temperature are important features of any plasma process and the skilled person will choose suitable values for these by a number of routine experiments without any inventive thought being required. Claim 13 does not meet the requirements of Article 33.3 PCT.

It is clear in D1 that the complete thickness of the dielectric layer is treated by the plasma, whereas in D2 it is explicitly stated that only surface regions of the layer need be treated to achieve a satisfactory result. With this information, the subject matter of claims 15 and 16 lacks inventive merit such that Article 33.3 PCT is not satisfied.

#### To Point VIII

The method of D1 is identical to that of claims 1, 3-7 and 12 but results in a dielectric layer having a dielectric constant of 3.2-3.4 (column 8, lines 8-12), whereas that of the application can be below 3.00 (claim 14). Hence it is not clear how an identical method can have a different end result, and it must be assumed that essential features are missing from the claims which would give rise to this improved result. Claim 14 does not meet the requirements of Article 6 PCT.

The features of claims 18 and 19 concern only properties of the layers formed by the method of any preceding claim. Thus either all the materials produced by the method of any of the preceding claims **must** satisfy the conditions of claims 18 and 19, or essential features are missing from the claims. These features would define further experimental parameters which would lead to the results of claims 18 and 19. These claims are either superfluous or they are unclear as they are defined in terms of a desired result to be achieved without any indication as to how the result might be obtained.

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 H01L21/316

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ✓	EP 0 761 841 A (CANON SALES CO INC ; SEMICONDUCTOR PROCESS LAB CO L (JP)) 12 March 1997 (1997-03-12) column 7 -column 9	1,3-7, 10-12,17
X ✓	US 5 270 267 A (OUELLET LUC M) 14 December 1993 (1993-12-14) column 3, line 43 - line 65; example 2	1,4,5, 12,17,18
X ✓ A	EP 0 519 079 A (FUJITSU LTD ;FUJITSU VLSI LTD (JP)) 23 December 1992 (1992-12-23) claims 1-3,15,16,18	1,2,6, 12,17-19 13
X ✓	DE 196 54 737 A (TOSHIBA KAWASAKI KK) 3 July 1997 (1997-07-03) abstract column 29; example 5 column 32, line 31 -column 33, line 17	1-3,14, 17

☐ Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

## \* Special categories of cited documents :

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*Z\* document member of the same patent family

Date of the actual completion of the international search

18 May 2000

Date of mailing of the international search report

25/05/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Szarowski, A



Patent document cited in search report		Publication date	Patent family member(s)	Publication date
/ EP 0761841	A	12-03-1997	JP 9064029 A	07-03-1997
			US 5800877 A	01-09-1998
US 5270267	A	14-12-1993	NONE	
✓ EP 0519079	A	23-12-1992	DE 69130947 D	08-04-1999
			DE 69130947 T	08-07-1999
			WO 9212535 A	23-07-1992
			JP 7093296 B	09-10-1995
			KR 9608508 B	26-06-1996
			US 5314724 A	24-05-1994
✓ DE 19654737	A	03-07-1997	JP 9237785 A	09-09-1997

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>BKCD/NS/DBN.105</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 00/ 00671</b>	International filing date (day/month/year) <b>24/02/2000</b>	(Earliest) Priority Date (day/month/year) <b>26/02/1999</b>
Applicant <b>TRIKON HOLDINGS LIMITED et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

## 4. With regard to the title,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

## 5. With regard to the abstract,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

## 6. The figure of the drawings to be published with the abstract is Figure No.



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

1



None of the figures.

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 H01L21/316

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 761 841 A (CANON SALES CO INC ; SEMICONDUCTOR PROCESS LAB CO L (JP)) 12 March 1997 (1997-03-12) column 7 -column 9	1,3-7, 10-12,17
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X A	EP 0 519 079 A (FUJITSU LTD ;FUJITSU VLSI LTD (JP)) 23 December 1992 (1992-12-23) claims 1-3,15,16,18	1,2,6, 12,17-19 13
X	DE 196 54 737 A (TOSHIBA KAWASAKI KK) 3 July 1997 (1997-07-03) abstract column 29; example 5 column 32, line 31 -column 33, line 17	1-3,14, 17

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

18 May 2000

Date of mailing of the international search report

25/05/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Szarowski, A

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PC 00/00671

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0761841	A	12-03-1997	JP 9064029 A US 5800877 A	07-03-1997 01-09-1998
US 5270267	A	14-12-1993	NONE	
EP 0519079	A	23-12-1992	DE 69130947 D DE 69130947 T WO 9212535 A JP 7093296 B KR 9608508 B US 5314724 A	08-04-1999 08-07-1999 23-07-1992 09-10-1995 26-06-1996 24-05-1994
DE 19654737	A	03-07-1997	JP 9237785 A	09-09-1997

PCT

REC'D 15 MAY 2001

WIPO PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference BD/JS/DBN.105	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/00671	International filing date (day/month/year) 24/02/2000	Priority date (day/month/year) 26/02/1999
International Patent Classification (IPC) or national classification and IPC H01L21/316		
Applicant TRIKON HOLDINGS LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
  - ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 16/09/2000	Date of completion of this report 11.05.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Cockcroft, Y Telephone No. +49 89 2399 2436 

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB00/00671

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, pages:**

1-17 as originally filed

**Claims, No.:**

1-19 as originally filed

**Drawings, sheets:**

1/11-11/11 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB00/00671

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes:	Claims 8-11, 13, 15, 16
	No:	Claims 1-7, 12, 14, 17-19
Inventive step (IS)	Yes:	Claims
	No:	Claims 8-11, 13, 15, 16
Industrial applicability (IA)	Yes:	Claims 1-19
	No:	Claims

2. Citations and explanations  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

**To Point V**

Reference is made to the following documents:

D1 = EP-A-0 761 841; and

D2 = DE-A-19 654 737.

Document D1 shows a method of processing a polymer layer via heating and exposure to a plasma during the heating (see column 7, lines 14-40). It is clear from the suggested starting materials of D1 (column 8, lines 24-45) that at least some of the polymers formed in D1 must include Si-C bonds. Moreover, it is explicitly stated that the heating and plasma treatment will remove moisture from the film (column 7, lines 52-55) and render it denser (column 7, lines 55-58). D1 contains all the features of claim 1 of the application. The claim lacks novel subject matter in comparison to this teaching and does not satisfy Article 33.2 PCT.

The method of claim 1 is also explicitly described in document D2 (see column 28, line 20 to column 29, line 37) wherein it is also clear that the treatment must, in some cases, desorb moisture (column 31, lines 7-16). Hence claim 1 also lacks new subject matter in comparison to this document. Article 33.2 PCT is not satisfied here either.

The plasma in D2 is a hydrogen plasma and claim 2 cannot render the subject matter of claim 1 new.

The plasma is present throughout the heating stage in both of the cited documents. Claim 3 lacks novel subject matter (Article 33.2 PCT) with respect to D1 or D2.

As can be seen from figure 2 of D1, the layer is supported on an electrode and an RF power source is connected to the electrode to partly maintain the plasma. Moreover, the power source to this electrode is 400 watts (column 7, lines 32-34). Claims 4 and 5 cannot be used to form a new claim with respect to D1.



Both D1 and D2 show the plasma being at least partly maintained by an RF power source feeding an electrode spaced apart from the layer (see figure 2 in D1 and figure 9 in D2). Moreover, the power to this electrode in D2 is 400 watts (column 7, lines 30-32). The subject matter of claim 6 lacks novelty in comparison to D1 or D2 and that of claim 7 lacks novelty with respect to D1. Article 33.2 PCT is not satisfied for either of these claims.

The layer of D1 is supported on a platen heated to 370°C (column 7, lines 20-21) such that claim 12 also lacks novel subject matter.

The method of D2 results in a film preferably having a dielectric constant of 1.0-2.5 (column 5, lines 51-53). Claim 14 does not contain any new subject matter in comparison to this teaching.

It is clear that in both documents the layer is an insulating layer on a semiconductor wafer. Claim 17 does not meet the requirements of Article 33.2 PCT.

As the methods of D1 and D2 are at least partially identical to those of the application, they must result in reduced cracking and improved wet etch rate of the layer. Claims 18 and 19 lack novel subject matter (see also point VIII below with respect to these claims).

Once it is known from D1 and D2 to use plasma treatment of the dielectric to improve the properties thereof, no inventive merit can be seen in the selection of an inductively coupled power source to maintain the plasma. This is one of a limited number of well known alternatives. Furthermore, the skilled person will select the required power without any inventive though being required. The subject matter of claims 8 and 9 does not satisfy Article 33.3 PCT.

The plasma treatment of D1 is performed for 5 minutes, that in D2 for 10 minutes. The skilled person would consider reducing these times, especially when the plasma power is higher than in the prior art. Claims 10 and 11 do not contain any inventive subject matter (Article 33.3 PCT).

Claim 13 is a combination of the features of claims 1-4 and 11 with the additional features that the power source provides 600 watts and the temperature of the platen is between 400°C and 500°C. It is quite clear that parameters such as the power and temperature are important features of any plasma process and the skilled person will choose suitable values for these by a number of routine experiments without any inventive thought being required. Claim 13 does not meet the requirements of Article 33.3 PCT.

It is clear in D1 that the complete thickness of the dielectric layer is treated by the plasma, whereas in D2 it is explicitly stated that only surface regions of the layer need be treated to achieve a satisfactory result. With this information, the subject matter of claims 15 and 16 lacks inventive merit such that Article 33.3 PCT is not satisfied.

#### **To Point VIII**

The method of D1 is identical to that of claims 1, 3-7 and 12 but results in a dielectric layer having a dielectric constant of 3.2-3.4 (column 8, lines 8-12), whereas that of the application can be below 3.00 (claim 14). Hence it is not clear how an identical method can have a different end result, and it must be assumed that essential features are missing from the claims which would give rise to this improved result. Claim 14 does not meet the requirements of Article 6 PCT.

The features of claims 18 and 19 concern only properties of the layers formed by the method of any preceding claim. Thus either all the materials produced by the method of any of the preceding claims **must** satisfy the conditions of claims 18 and 19, or essential features are missing from the claims. These features would define further experimental parameters which would lead to the results of claims 18 and 19. These claims are either superfluous or they are unclear as they are defined in terms of a desired result to be achieved without any indication as to how the result might be obtained.

24.11.01  
13.12.00From the:  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

DUNLOP, Brian Kenneth  
Wynne-Jones, Lainé & James  
Essex Place, 22 Rodney Road  
Cheltenham  
Gloucestershire, GL50 1JJ  
GRANDE BRETAGNE

PCT

WRITTEN OPINION

(PCT Rule 66)

Date of mailing  
(day/month/year) 24.11.2000Applicant's or agent's file reference  
BD/JS/DBN.105**REPLY DUE** **within 3 month(s)**  
from the above date of mailingInternational application No.  
PCT/GB00/00671International filing date (day/month/year)  
24/02/2000Priority date (day/month/year)  
26/02/1999International Patent Classification (IPC) or both national classification and IPC  
H01L21/316

Applicant

TRIKON HOLDINGS LIMITED et al.

1. This written opinion is the **first** drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:
  - I ☒ Basis of the opinion
  - II ☐ Priority
  - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  - IV ☐ Lack of unity of invention
  - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  - VI ☐ Certain document cited
  - VII ☐ Certain defects in the international application
  - VIII ☒ Certain observations on the international application

3. The applicant is hereby **invited to reply** to this opinion.

**When?** See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

**How?** By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

**Also:** For an additional opportunity to submit amendments, see Rule 66.4.  
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.  
For an informal communication with the examiner, see Rule 66.6.

**If no reply is filed**, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 26/06/2001.

Name and mailing address of the international preliminary examining authority:

European Patent Office  
D-80298 Munich  
Tel. +49 89 2399 - 0 Tx: 523656 epmu d  
Fax: +49 89 2399 - 4465

Authorized officer / Examiner

Cockcroft, Y

Formalities officer (incl. extension of time limits)

Reddy, J  
Telephone No. +49 89 2399 2231

## I. Basis of the opinion

1. This opinion has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"*):

## Description, pages:

1-17 as originally filed

## Claims, No.:

1-19 as originally filed

## Drawings, sheets:

1/11-11/11 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N) Claims 1-7, 12, 14, 17-19: No 8-11, 13, 15, 16: Yes

Inventive step (IS) Claims 8-11, 13, 15, 16: No

Industrial applicability (IA) Claims 1-19: Yes

2. Citations and explanations  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**To Point V**

Reference is made to the following documents:

D1 = EP-A-0 761 841; and

D2 = DE-A-19 654 737.

Document D1 shows a method of processing a polymer layer via heating and exposure to a plasma during the heating (see column 7, lines 14-40). It is clear from the suggested starting materials of D1 (column 8, lines 24-45) that at least some of the polymers formed in D1 must include Si-C bonds. Moreover, it is explicitly stated that the heating and plasma treatment will remove moisture from the film (column 7, lines 52-55) and render it denser (column 7, lines 55-58). D1 contains all the features of claim 1 of the application. The claim lacks novel subject matter in comparison to this teaching and does not satisfy Article 33.2 PCT.

The method of claim 1 is also explicitly described in document D2 (see column 28, line 20 to column 29, line 37) wherein it is also clear that the treatment must, in some cases, desorb moisture (column 31, lines 7-16). Hence claim 1 also lacks new subject matter in comparison to this document. Article 33.2 PCT is not satisfied here either.

The plasma in D2 is a hydrogen plasma and claim 2 cannot render the subject matter of claim 1 new.

The plasma is present throughout the heating stage in both of the cited documents. Claim 3 lacks novel subject matter (Article 33.2 PCT) with respect to D1 or D2.

As can be seen from figure 2 of D1, the layer is supported on an electrode and an RF power source is connected to the electrode to partly maintain the plasma. Moreover, the power source to this electrode is 400 watts (column 7, lines 32-34). Claims 4 and 5 cannot be used to form a new claim with respect to D1.

Both D1 and D2 show the plasma being at least partly maintained by an RF power source feeding an electrode spaced apart from the layer (see figure 2 in D1 and figure 9 in D2). Moreover, the power to this electrode in D2 is 400 watts (column 7, lines 30-32). The subject matter of claim 6 lacks novelty in comparison to D1 or D2 and that of claim 7 lacks novelty with respect to D1. Article 33.2 PCT is not satisfied for either of these claims.

The layer of D1 is supported on a platen heated to 370°C (column 7, lines 20-21) such that claim 12 also lacks novel subject matter.

The method of D2 results in a film preferably having a dielectric constant of 1.0-2.5 (column 5, lines 51-53). Claim 14 does not contain any new subject matter in comparison to this teaching.

It is clear that in both documents the layer is an insulating layer on a semiconductor wafer. Claim 17 does not meet the requirements of Article 33.2 PCT.

As the methods of D1 and D2 are at least partially identical to those of the application, they must result in reduced cracking and improved wet etch rate of the layer. Claims 18 and 19 lack novel subject matter (see also point VIII below with respect to these claims).

Once it is known from D1 and D2 to use plasma treatment of the dielectric to improve the properties thereof, no inventive merit can be seen in the selection of an inductively coupled power source to maintain the plasma. This is one of a limited number of well known alternatives. Furthermore, the skilled person will select the required power without any inventive thought being required. The subject matter of claims 8 and 9 does not satisfy Article 33.3 PCT.

The plasma treatment of D1 is performed for 5 minutes, that in D2 for 10 minutes. The skilled person would consider reducing these times, especially when the plasma power is higher than in the prior art. Claims 10 and 11 do not contain any inventive subject matter (Article 33.3 PCT).

Claim 13 is a combination of the features of claims 1-4 and 11 with the additional features that the power source provides 600 watts and the temperature of the platen is between 400°C and 500°C. It is quite clear that parameters such as the power and temperature are important features of any plasma process and the skilled person will choose suitable values for these by a number of routine experiments without any inventive thought being required. Claim 13 does not meet the requirements of Article 33.3 PCT.

It is clear in D1 that the complete thickness of the dielectric layer is treated by the plasma, whereas in D2 it is explicitly stated that only surface regions of the layer need be treated to achieve a satisfactory result. With this information, the subject matter of claims 15 and 16 lacks inventive merit such that Article 33.3 PCT is not satisfied.

#### To Point VIII

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## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner  
 US Department of Commerce  
 United States Patent and Trademark  
 Office, PCT  
 2011 South Clark Place Room 524  
 Arlington, VA 22202  
 ETATS-UNIS D'AMERIQUE  
 ETATS-UNIS D'AMERIQUE  
 in its capacity as elected Office

<b>Date of mailing</b> (day/month/year) 26 October 2000 (26.10.00)	
<b>International application No.</b> PCT/GB00/00671	<b>Applicant's or agent's file reference</b> BKCD/NS/DBN.105
<b>International filing date</b> (day/month/year) 24 February 2000 (24.02.00)	<b>Priority date</b> (day/month/year) 26 February 1999 (26.02.99)
<b>Applicant</b> MACNEIL, John et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
 16 September 2000 (16.09.00)

☐ in a notice effecting later election filed with the International Bureau on:  
 \_\_\_\_\_

2. The election ☒ was  
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Zakaria EL KHODARY Telephone No.: (41-22) 338.83.38
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